OPTICAL DISK

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Abstract of **JP2002175662**

PROBLEM TO BE SOLVED: To provide an optical disk with a copy-preventive function. SOLUTION: CD-DA data containing a prescribed length of a direct current component in the information recording region are recorded on an optical disk. As a result, an attempt to copy the whole disk fails because such data are discriminated as incorrect data, the reading thereafter is stopped, and the data are thereby prevented from being copied.

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(54) OPTICAL DISK

(57) Abstract:

PROBLEM TO BE SOLVED: To provide an optical disk with a copy-preventive function.

SOLUTION: CD-DA data containing a prescribed length of a direct current component in the information recording region are recorded on an optical disk. As a result, an attempt to copy the whole disk fails because such data are discriminated as incorrect data, the reading thereafter is stopped, and the data are thereby prevented from being copied.

トラック番号	内 容
00	TOC
01	ファイルシステム
	ファイル1 (CD−ROM)
	ファイル2 〔CD−DA (DC) 〕
	ファイル3 (CD−ROM)
	・ ・ ・ ・
	ファイルN (CD−ROM)
02	楽音 (CD−DA)
03	楽音 (CD−DA)
	・ ・ ・ ・

English Translation of
Japanese Patent Provisional Publication No. 2002-175662

[What is claimed is:]

[Claim 1]

An optical disc comprising an information recording area in which CD-DA data are stored, said data including a direct-current component in a predetermined length.

[Claim 2]

The optical disc as claimed in Claim 1, wherein: the CD-DA data including said direct-current component are stored in an initial section of said information recording area.

[Claim 3]

The optical disc as claimed in Claim 1 or 2, wherein: the CD-DA data including said direct-current component are stored in a plurality of sections of said information recording area.

[Claim 4]

The optical disc as claimed in any one of Claims 1 to 3, wherein: said information recording area serves as an area in which CD-ROM data are to be recorded, and the CD-DA data including said direct-current component, to which a file name has given, are recorded.

[Claim 5]

The optical disc as claimed in any one of Claims 1 to 4, wherein: the CD-DA data including said direct-current component are recorded in a predetermined section of said information recording area so as to follow a CD-DA data, a reference is made to the section of said information recording area, in which the CD-DA data including said direct-current component are recorded so as to follow said CD-DA data, and a subsequent processing is terminated, when an initial sub-section of said section, to which the reference has been made, is not of the CD-DA data.

[Claim 6]

The optical disc as claimed in any one of Claims 1 to 5, wherein: the CD-DA data including said direct-current component are recorded in a predetermined section of said information recording area so as to follow a CD-DA data, a reference is made to the section of said information recording area, in which the CD-DA data including said direct-current

component are recorded so as to follow said CD-DA data, and a subsequent processing is terminated, when a volume of the section, to which the reference has been made, is not equal to a predetermined volume.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[TECHNICAL FILED TO WHICH THE INVENTION BELONGS]

The present invention relates to an optical disc in which information is recorded.

[0002]

[CONVENTIONAL TECHNOLOGY]

An optical disc (CD), which has a large storage capacity and enables data of a desired file to be read out easily, has been widely used for record of digital data.

[0003]

[SUBJECT TO BE SOLVED BY THE INVENTION]

On the other hand, data recorded in a CD have been copied in its entirety to prepare a duplicate copy of the CD, or data recorded in a CD have been read out through a personal computer to copy the data. An object of the present invention is to provide an optical disc, which prevents data from being copied.

[0004]

[MEANS TO SOLVE THE SUBJECT]

In the present invention claimed in Claim 1, CD-DA data are stored, the data including a direct-current component in a predetermined length. In the present invention Claimed in Claim 2, the CD-DA data including the direct-current component are stored in an initial section of the information recording area.

[0005]

In the present invention claimed in Claim 3, the CD-DA data including the direct-current component are stored in a plurality of sections of the information recording area. In the present invention claimed in Claim 4, the information recording area serves as an area in which CD-ROM data are to be recorded, and the CD-DA data including the direct-current component, to which a file name has given, are recorded.

[0006]

In the present invention claimed in Claim 5, the CD-DA data including the direct-current component are recorded in a predetermined section of the information recording area so as to follow a CD-DA data, a reference is made to the section of the information recording area, in which the CD-DA data including the direct-current component are recorded so as to follow the CD-DA data, and a subsequent processing is terminated, when an initial sub-section of the section, to which the reference has been made, is not of the CD-DA data.

[0007]

In the present invention claimed in Claim 6, the CD-DA data including the direct-current component are recorded in a predetermined section of the information recording area so as to follow a CD-DA data, a reference is made to the section of the information recording area, in which the CD-DA data including the direct-current component are recorded so as to follow the CD-DA data, and a subsequent processing is terminated, when a volume of the section, to which the reference has been made, is not equal to a predetermined volume.

[0008]

[EMBODIMENT OF THE INVENTION]

Embodiments of the present invention will be described with reference to FIG. 1. FIG. 1 is a view illustrating one of examples of information recording states in the first embodiment of the present invention. Prior to description of the embodiment of the present invention, a principle of the present invention will be described first.

[0009]

What is to be recorded on a CD is digital information. The digital information is recorded on the CD through a format, which depends on normal digital information or digital information in which analog signals are converted into digital signals such as musical information.

[0010]

The data recorded with the format for the above-mentioned normal digital information will be hereinafter referred to as the "CD-ROM data". The data recorded with the format for the musical digital information will be hereinafter referred to as the "CD-DA data".

[0011]

The CD also includes recorded information, which is indicative that the recorded data is the CD-ROM or CD-DA data. When the data is reproduced from the CD, a reading operation is carried out to read the information, which is indicative that the recorded data is the CD-ROM or CD-DA, and then reproduction of the data is performed based on the format corresponding to the information as read out.

[0012]

The principle of the present invention utilizes the reproduction of the CD-DA data. Experiments were made to obtain a finding that reproduction of the CD-DA data, which include a direct-current component, and namely, has a value kept continuously constant over a predetermined length (hereinafter referred to as the "CD-DA(DC)"), causes occurrence of a seek error, on the basis of which a subsequent operation of reproducing data is terminated. The present invention utilizes such termination of the reproduction operation.

[0013]

FIG. 1 shows an example of states in which information is recorded on the CD according to the first embodiment of the present invention. The information is recorded on the CD so that a single data group to be recorded corresponds to a single track. The track is composed of a plurality of sectors each of which has 2352 bytes. The number of sectors varies depending upon an amount of data to be recorded.

[0014]

As shown in FIG. 1, a TOC (Table of Contents) is recorded in a track #00. When the data are reproduced from the CD, an access to the track #00 is made first, and then the data of the track number as specified based on the TOC recorded are reproduced.

[0015]

The recording example as shown in FIG. 1 is indicative of a case where the CD-ROM data are recorded in the track #01, and the CD-DA data are recorded in the track #02 and #03. An area in which the CD-ROM data are recorded is provided with a file-system area in which a name, size, date, properties, etc. of the file are recorded.

[0016[

Designation of the track #01 based on the TOC first makes an

access to a file system for it, with the result that the data of the recording position of the target file are read out and the reading of the recorded information is started.

[0017]

Files #1 to #N are recorded in the track #01 as shown in FIG. 1, following the record of the file system. The file #2, which is associated with the present invention, includes the CD-DA(DC) data recorded therein, which have the above-described direct-current component.

[0018]

The fact that the file #2 is of the CD-DA data causes the properties of the file #2 under the above-described file system to be recorded as the "CD-DA". Consequently, an access to the file system of the track #02 is made. When the reading of the file #2 is carried out, the properties of "CD-DA" permits reproduction of the CD-DA in the same manner as the musical information.

[0019]

When an attempt is made to copy the data recorded in the CD in its entirety to prepare a duplicate copy thereof, the reading of the CD-DA(DC) data during a reading operation of the data recorded in the CD causes occurrence of a seek error, with the result that the reading is terminated and consequently, preparation of the duplicate copy halts, thus preventing the data from being copied.

[0020]

In the first embodiment as shown in FIG. 1, the CD-DA(DC) data is recorded in a single section. However, these data may be recorded in a plurality of sections. Providing a recording position for the CD-DA(DC) in a place in which the data followed by the information recording area can be read out, causes occurrence of a seek error at the same time when the copying operation starts, to terminate the operation. Accordingly, the recorded information cannot be read out, thus preventing it from being copied.

[0021]

Now, the second embodiment of the present invention will be described with reference to FIG. 2. FIG. 2 is a view illustrating one of examples of information recording states in the second embodiment of the present invention. The first embodiment takes notice of the

operation in which the information recorded in the CD is to be copied in its entirety. It is possible to read out the information recorded in the CD for each file therein through a personal computer. In addition, it is possible to record the information read for each file in another CD.

[0022]

The second embodiment prevents the information for each file from being read out to copy it. There exist differences between the second embodiment as shown in FIG. 2 and from the first embodiment as shown in FIG. 1 in that, in the second embodiment as shown in FIG. 2, the file system of the track #01 in which the CD-ROM data are recorded is recorded, followed by the recording of a start program described later, and the CD-DA(DC) data are recorded as the data of the file #2, followed by the recording of the CD-DA(DC) data.

[0023]

FIG. 3 shows an example of an operation flowchart of the start program. When the CD is loaded into a personal computer and an access to a selected file is made, Step S1 starts.

[0024]

In Step S1, the reading of the recorded data starts from the recording start position in which the data of CD-DA + CD-DA(DC) of the file #2 are recorded. In Step S2, it is judged as whether or not the data as read out is of the CD-DA data. In case where the judgment result is "NO", namely, the read data is not of the CD-DA data, the subsequent reading of the file data is terminated.

[0025]

In case where the judgment result is "YES", the system enters Step S3, and it is judged whether or not the amount of data recorded in CD-DA + CD-DA(DC) of the file #2 is equal to a predetermined volume (the volume of the file #2 in the original CD). In case where the judgment result is "NO", the subsequent reading of the file data is terminated.

[0026[

Coincidence in volume causes the reading of the data recorded in the file to start. When the CD is original, judgment results in Steps S2 and S3 both become "YES", thus permitting the reading from the file.

[0027]

When the file is copied, the start program is also copied together

with the file data. Accordingly, reading the data of the copied file causes the start program to be operated, with the result Steps S1 and S2 are carried out, and it is judged in Step S2 as whether or not the data is of CD-DA.

[0028]

Requirement for the judgment in Step S2 being "YES" is that the CD-DA data must be recorded in the reading start position, which is designated in Step S1. When an attempt is made to read CD-DA + CD-DA(DC) data in the file #2 as shown in FIG. 2 from the original CD, to copy them, the CD-DA data in the initial section can be read out to copy them, but the reading of the subsequent CD-DA(DC) data causes a seek error in the same manner as described above, and consequently the operation is terminated, thus disabling the data from being copied.

[0029]

Accordingly, the judgment result in Step S2 becomes "NO", and the reading operation is terminated. In case where any CD-DA data is recorded in the position as designated in Step S1, it is judged in Step S3 whether or not there is coincidence in recording volume. The reading operation is terminated unless the volume is coincide with the recording volume of CD-DA + CD-DA(DC), which has been recorded in the original CD, thus disabling the copied file from being used.

[0030]

In the embodiments, the CD is used as the recording medium. Another optical disc than the CD may be used.

[0031]

In Japanese Patent Application No. 2000-41027 (unauthorized copy-prevention recording medium) filed by the same applicant, there is provided a dummy file in which a recording capacity for recording a file system is set to be larger than the actual record volume, and unauthorized copy can be prevented on a basis of judgment as whether such a dummy file exists or not, or the record volume of the dummy file coincides with that of the original. The present invention may be provided with such a copy-prevention device to ensure prevention of unauthorized copy.

[0032]

[Effect of the invention]

The CD-DA data including the direct-current component in a predetermined length are recorded in the information recording area of the optical disc. Accordingly, when an attempt is made to read out the data recorded in the optical disc to copy them, a seek error is generated to terminate the reading, thus preventing the copying operation.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[FIG. 1]

FIG. 1 is a view illustrating one of examples of information recording states in the first embodiment of the present invention.

[FIG. 2]

FIG. 2 is a view illustrating one of examples of information recording states in the second embodiment of the present invention.

[FIG. 3]

FIG. 3 is a flowchart of an operation of the start program

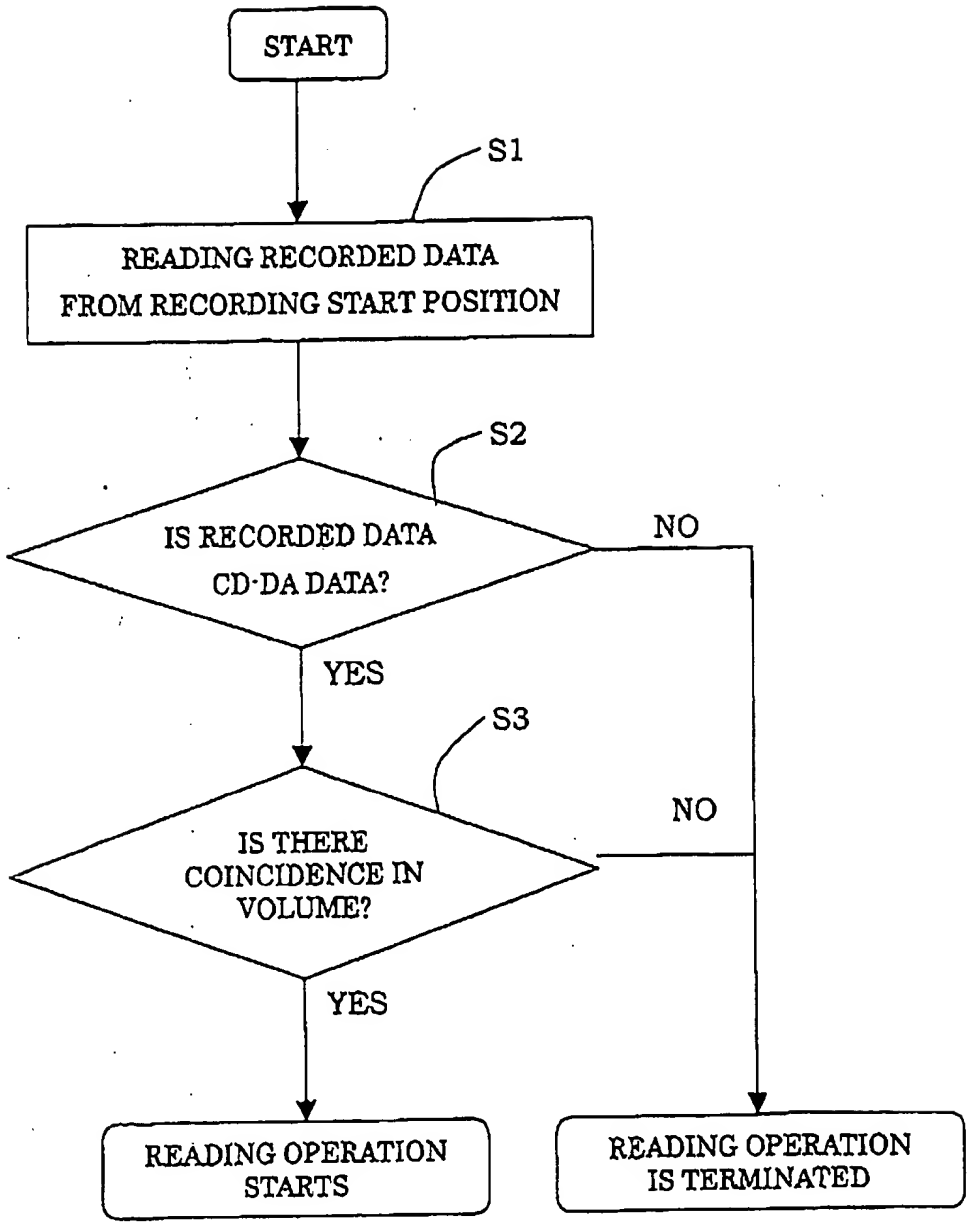
[FIG. 1]

Track number	Contents
00	TOC
01	File system
	File #1 (CD-ROM)
	File #2 (CD-DA(DC))
	File #3 (CD-ROM)
	• • • •
	File #N (CD-ROM)
02	Musical sound (CD-DA)
03	Musical sound (CD-DA)
	• • • •

[FIG. 2]

Track number	Contents
00	TOC
01	File system
	Start program
	File #1 (CD-ROM)
	File #2 (CD-DA + CD-DA(DC))
	File #3 (CD-ROM)
	• • • •
	File #N (CD-ROM)
02	Musical sound (CD-DA)
03	Musical sound (CD-DA)
	• • • •

[FIG. 3]


START
S1
READING RECORDED DATA FROM RECORDING START POSITION
S2
IS RECORDED DATA CD-DA DATA?
NO
YES
S3
IS THERE COINCIDENCE IN VOLUME?
NO
YES
READING OPERATION STARTS
READING OPERATION IS TERMINATED